

REMARKS

Reconsideration and allowance of the present patent application based on the foregoing amendments and following remarks are respectfully requested.

By this Response, no claims are amended, cancelled or added. Accordingly, after entry of this Response, claims 1 and 3-21 will remain pending in the patent application.

Claims 4-12 and 14-21 were rejected under 35 U.S.C. §102(b) based on Hansler *et al.* (U.S. Pat. No. 4,935,668) (hereinafter "Hansler"). The rejection is respectfully traversed.

Claim 4 is patentable over Hansler at least because this claim recites a high-intensity discharge lamp including an arc tube, wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide that comprises at least halides of Na, Tl, In, and Tm and a starting gas; and the total mass of the halides of Na, Tl, In and Tm is greater than 90% of the total mass of the metal halide. Hansler does not disclose, teach or suggest these features.

Hansler discloses a light source 16 that contains a fill consisting of mercury and a metal halide. Hansler discloses that the metal halide is a mixture of an amount in the range of about 2mg to 50mg and comprises halides selected from the group given in Table I. (*See, e.g.*, col. 5, lines 25-65 of Hansen).

The Examiner refers to Table I of Hansler as allegedly disclosing, teaching or suggesting a discharge chamber filled with a discharge medium including a metal halide that comprises at least halides of Na, Tl, In, and Tm. Respectfully, those cited portions of Hansler merely disclose that "the mixture [of metal halides] is comprised of halides selected from the group given in Table 1." (*See, e.g.*, col. 5, lines 53-54 of Hansler, emphasis added). In other words, Sodium, Thallium, Indium and Thulium are merely potential candidates among many others that could be part of the mixture. However, there are clearly no teachings or suggestions in Hansler of a mixture that comprises at least halides of Na, Tl, In, and Tm, as required in claim 4.

As explained in Applicants' Amendment of January 4, 2006, Hansler merely discloses a genus that includes a list of metal halides, *i.e.*, Sodium Iodine, Scandium Iodine, Thallium Iodine, Indium Iodine, Tin Iodine, Dysprosium Iodine, Holmium Iodine, Thulium Iodine, Thorium Iodine, Cadmium Iodine and Cesium Iodine, and teaches that the metal halide includes halides (*i.e.*, at least two halides) selected from this list. Hansler does not disclose, teach or suggest the particular species recited in claim 4 and, as such, cannot anticipate claim 4.

Specifically, Applicants respectfully note that over 500 combinations ($\sum_{i=2}^9 C_i^9 = 502$) of at least two metal halides could be created with the list of metal halides disclosed by Hansler. Furthermore, over 380 combinations of at least 4 elements and 126 combinations of exactly 4 elements could be created with this list of metal halides. Accordingly, because (a) Hansler does not name the specific species recited by claim 4, (b) a vast number of species could be created based on the list (genus) disclosed by Hansler, and (c) Hansler fails to describe any of the combinations that could be created based on this list, Applicants respectfully submit that Hansler cannot anticipate claim 4. (*See* MPEP 2131.02, citing In Re Petering, 301 F.2d 676, 133 USPQ 275 (CCPA 1962)). For at least this reason, Applicants respectfully request that the anticipatory rejection of claim 4 be withdrawn.

It is also noted that the Examiner acknowledged in pages 5 and 6 of the Office Action dated March 24, 2006 that these features were not disclosed, taught or suggested by Hansler.

In addition, Applicants respectfully submit that claim 4 is not rendered obvious based on Hansler at least because Hansler fails to recognize the criticality of the mixture of metal halides used in the discharge lamp. As explained, for example, in paragraph [0017] of the specification, a lighting device including a metal halide that comprises at least halides of Na, Tl, In, and Tm possesses unexpected results relative to the prior art emission properties in terms of light luminous efficiency, correlated color temperature, color rendition, life and low variation in correlated color temperature and chromaticity with operating positions. Because Hansler is silent as to criticality of the mixture of metal halides, claim 4 cannot be rendered obvious based on Hansler. (*See* MPEP 716.02(a)).

The Examiner also alleges in the Office Action that Hansler discloses a high-intensity discharge lamp including an arc tube, the arc tube “wherein the total mass of the halides of Na, Tl, In and Tm is greater than 90% of the total mass of the metal halide.” (*See* paragraph 5 of the Office Action). However, the Examiner has failed to point out where Hansler discloses, teaches or suggests these features. Rather, the Examiner merely contends that “if halides of Na, Tl, In and Tm are the only halides selected from Table 1 of Hansler, the total mass of the halides would be 100% of the total mass of the metal halide, which is greater than 90% of the total mass.” However, Applicants respectfully submit that the Examiner’s reasoning is flawed as it assumes that Hansler expressly or implicitly discloses, teaches or suggests that the mixture of halides must include Na, Tl, In and Tm, which, as mentioned previously, is not the case. On the contrary, Hansler merely discloses preparing a mixture by selecting some of the halides listed in Table I, without pointing to any particular

halides. There are no explicit or implicit teachings in Hansler that the mixture must include Na, Tl, In and Tm. Thus, the Examiner's determination that Hansler discloses that the total mass of the halides of Na, Tl, In and Tm is greater than 90% of the total mass of the metal halide is incorrect. Therefore, claim 4 is patentable over Hansler.

Claim 5 is patentable over Hansler for at least similar reasons as provided above for claim 5 and for the features recited therein. Namely, claim 5 is patentable over Hansler at least because this claim recites a high-intensity discharge lamp including an arc tube, wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide that comprises at least halides of Na, Tl, In, and Tm and a starting gas; and the ratio (MTm/M) of the mass MTm of said Tm halide to the total mass M of said metal halide is within a range of about $0.4 \leq MTm / M \leq 0.9$. Hansler does not disclose, teach or suggest these features.

As mentioned previously, Hansler does not disclose, teach or suggest a discharge chamber that is filled with a discharge medium including a metal halide that comprises at least halides of Na, Tl, In, and Tm.

The Examiner alleges that if halides of Na, Tl, In, and Tm are the only halides selected from Table 1 of Hansler then the ratio (MTm/M) of the mass MTm of said Tm halide to the total mass M of said metal halide is within a range of about $0.4 \leq MTm / M \leq 0.9$. Applicants respectfully disagree for at least the following reasons.

First, the Examiner's exclusive reliance on the atomic weight of Na, Tl, In, Tm and I to calculate the ratios discussed in claim 5 is absolutely meaningless in relation to the subject matter of the present invention. For example, "1145.647" is a meaningless sum of molecular weights of MNa , MTm , MTl and MIn , and does not represent a practical total mass of the metal halide. Applicants respectfully submit that the "molecular weight" and the "mass" are completely different concepts. Thus, the Examiner's determination that the ratio of claim 5 is disclosed is incorrect.

Second, the Examiner assumes as a fact that Hansler implicitly or explicitly discloses, teaches or suggest that the mixture of Halides must include Na, Tl, In, and Tm. This assumption is clearly improper and finds no support in Hansler's teachings.

As mentioned previously, over 500 combinations of at least two metal halides could be created with the list of metal halides disclosed by Hansler. Among these are over 500 combinations, over 460 combinations (466) of at least 3 elements and 84 combinations of exactly 3 elements, which could be created with this list of metal halides. Accordingly, because (a) Hansler does not name the specific species recited by claim 5, (b) a vast number

of species could be created based on the list (genus) disclosed by Hansler, and (c) Hansler fails to describe any of the combinations that could be created based on this list, Applicants respectfully submit that Hansler cannot render obvious claim 5. (*See* MPEP 2131.02, citing In Re Petering, 301 F.2d 676, 133 USPQ 275 (CCPA 1962)).

Furthermore, Hansler fails to recognize the criticality of the mixture of metal halides used in the discharge lamp. A lighting device including a metal halide that comprises halides of Na, Tl, and Tm with a mass ratio of claim 5 possesses unexpected results relative to the prior art emission properties in terms of light luminous efficiency, correlated color temperature, color rendition, life and low variation in correlated color temperature and chromaticity with operating positions. Specifically, Applicants respectfully submit that the claimed mass ratio provides unexpected results over the prior art because, since ceramics are inactive to Thulium, a sufficient amount of Thulium halide that exhibits blue ray illumination can be filled in the ceramic discharge to obtain white coloring of illumination in combination with Na (red) and Tl (green). Because Hansler is silent as to the criticality of the mixture of metal halides and the mass ratio of Thulium to improve the illumination characteristics, claim 5 cannot be rendered obvious based on Hansler. (*See* MPEP 716.02(a)).

Claim 6 is patentable over Hansler for at least similar reasons as provided above for claims 4 and 5 and for the features recited therein. Namely, claim 6 is patentable over Hansler at least because this claim recites a high-intensity discharge lamp including an arc tube, wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide and a starting gas, said metal halide comprising at least halides of Na, Tl, In, and Tm, the ratio (MTm/M) of the mass MTm of said Tm halide to the total mass M of said metal halide is within a range of about $0.4 \leq MTm / M \leq 0.9$, and the total mass of the halides of Na, Tl, In, Tm halides is greater than 90% of the total mass M of the metal halide. These features are absent in Hansler.

Claim 7 is patentable over Hansler for at least similar reasons as provided above for claims 4 and 5 and for the features recited therein. Namely, claim 6 is patentable over Hansler at least because this claim recites a high-intensity discharge lamp including an arc tube, wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide that comprises at least halides of Na, Tl, In, and Tm and a starting gas; and the ratio $(MTm + MTl + MIn)/M$ of the sum of the mass MTm of the Tm halide and the mass MTl of the Tl halide and the mass MIn of the In halide to the total mass M of the metal halide is within a range of about $0.61 \leq (MTm + MTl + MIn)/M \leq 0.9$, and the ratio (MIn/M) of the

mass of the In halide to the total mass M of the metal halide is within a range of about $0.01 \leq M_{In}/M \leq 0.1$.

The Examiner alleges that if halides of Na, Tl, In, and Tm are the only halides selected from Table 1 of Hansler then the ratio (M_{In}/M) of the mass of the In halide to the total mass M of the metal halide is within a range of about $0.01 \leq M_{In}/M \leq 0.1$. However, as mentioned previously, the Examiner assumes as a fact that Hansler implicitly or explicitly discloses, teaches or suggests that the mixture of Halides must include Na, Tl, In, and Tm. This assumption is clearly improper and finds no support in Hansler's teachings for at least the same reasons provided above for claims 4 and 5.

Claim 8 is patentable over Hansler at least by virtue of its dependency from claim 6 and for the additional features recited therein.

Claims 9-12, 14-15, 20(6) and 21(6) are patentable over Hansler at least by virtue of their dependency from claims 1, 3, 4 and 6.

Claims 16-19, 20(1) and 21(1) are patentable over Hansler at least by virtue of their dependency from claim 1, which has not been rejected under 35 U.S.C. §102(b) based on Hansler.

Accordingly, reconsideration and withdrawal of the rejection of claims 4-12 and 14-21 under 35 U.S.C. §102(b) based on Hansler are respectfully requested.

Claims 1 and 3 were rejected under 35 U.S.C. §103(a) based on Hansler in view of Kobayashi (U.S. Pat. No. 4,503,356). The rejection is respectfully traversed.

As conceded by the Examiner, Hansler fails to disclose, teach or suggest a high-intensity discharge lamp including an arc tube, the arc tube comprising, *inter alia*, a translucent ceramic discharge chamber. However, there are additional features that are absent in Hansler.

For example, Hansler fails to disclose, teach or suggest a high-intensity discharge lamp including an arc tube wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide and a starting gas, said metal halide comprising at least halides of Na, Tl, and Tm, and the ratio (M_{Tm}/M) of the mass M_{Tm} of Tm halide to the total mass M of said metal halide is within a range of about $0.4 \leq M_{Tm}/M \leq 0.9$.

The Examiner alleges that if halides of Na, Tl, In, and Tm are the only halides selected from Table 1 of Hansler then the ratio (M_{Tm}/M) of the mass M_{Tm} of Tm halide to the total mass M of said metal halide is within a range of about $0.4 \leq M_{Tm}/M \leq 0.9$. Applicants respectfully disagree and submit that the Examiner's exclusive reliance on the atomic weight of Na, Tl, In, Tm and I to calculate the ratios discussed in claim 1 is absolutely

meaningless in relation to the subject matter of the present invention. For example, “903.925” is a meaningless sum of molecular weights of MNa, MTm, MTl, and does not represent a practical total mass of the metal halide. Applicants respectfully submit that the “molecular weight” and the “mass” are completely different concepts. Thus, the Examiner’s determination that the ratio of claim 1 is disclosed by Hansler is clearly incorrect.

Furthermore, Applicants respectfully submit that the features of claim 1 are not obvious for at least the following reasons.

First, Hansler is silent as to a mixture that includes the specific combination of halides recited in claim 1. As mentioned previously, Hansler merely discloses a genus that includes a list of metal halides, *i.e.*, Sodium Iodine, Scandium Iodine, Thallium Iodine, Indium Iodine, Tin Iodine, Dysprosium Iodine, Holmium Iodine, Thulium Iodine, Thorium Iodine, Cadmium Iodine and Cesium Iodine, and teaches that the metal halide includes halides (*i.e.*, at least two halides) selected from this list. Hansler does not disclose, suggest or even hint at the particular species recited in claim 1 and, as such, cannot anticipate claim 1.

Second, as mentioned previously, over 500 combinations of at least two metal halides could be created with the list of metal halides disclosed by Hansler. Among these over 500 combinations, over 460 combinations (466) of at least 3 elements and 84 combinations of exactly 3 elements, which could be created with this list of metal halides. Accordingly, because (a) Hansler does not name the specific species recited by claim 1, (b) a vast number of species could be created based on the list (genus) disclosed by Hansler, and (c) Hansler fails to describe any of the combinations that could be created based on this list, Applicants respectfully submit that Hansler cannot render obvious claim 1. (*See* MPEP 2131.02, citing In Re Petering, 301 F.2d 676, 133 USPQ 275 (CCPA 1962)).

Third, Hansler fails to recognize the criticality of the mixture of metal halides used in the discharge lamp. A lighting device including a metal halide that comprises halides of Na, Tl, and Tm with a mass ratio of claim 1 possesses unexpected results relative to the prior art emission properties in terms of light luminous efficiency, correlated color temperature, color rendition, life and low variation in correlated color temperature and chromaticity with operating positions. Specifically, Applicants respectfully submit that the claimed mass ratio provides unexpected results over the prior art because, since ceramics are inactive to Thulium, a sufficient amount of Thulium halide that exhibits blue ray illumination can be filled in the ceramic discharge to obtain white coloring of illumination in combination with Na (red) and Tl (green). Because Hansler is silent as to the criticality of the mixture of metal

halides and the mass ratio of Thulium to improve the illumination characteristics, claim 1 cannot be rendered obvious based on Hansler. (See MPEP 716.02(a)).

Kobayashi fails to remedy the deficiencies of Hansler. Kobayashi merely discloses a ceramic arc tube for metal vapor discharge lamps but fails to disclose, teach or suggest the features of claim 1. Thus, any reasonable combination of Hansler and Kobayashi cannot result, in any way, in the invention of claim 1.

Claim 3 is patentable over Hansler, Kobayashi and any proper combination thereof at least by virtue of its dependency from claim 1 and for the additional features recited therein.

Accordingly, reconsideration and withdrawal of the rejection of claims 1 and 3 under 35 U.S.C. §103(a) based on Hansler in view of Kobayashi are respectfully requested.

Claim 13 was rejected under 35 U.S.C. §103(a) based on Hansler in view of Higashi (U.S. Pat. No. 4,024,425). The rejection is respectfully traversed.

Claims 13(1) and 13(3) are patentable over Hansler at least because these claims recite a high-intensity discharge lamp including an arc tube wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide and a starting gas, said metal halide comprising at least halides of Na, Tl, and Tm, and wherein the ratio (MT_m/M) of the mass MT_m of Tm halide to the total mass M of said metal halide is within a range of about $0.4 \leq MT_m/M \leq 0.9$. Claim 13(4) is patentable over Hansler at least because this claim recites a high-intensity discharge lamp including an arc tube wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide and a starting gas, and wherein said metal halide comprises at least halides of Na, Tl, In, and Tm. Claim 13(5) is patentable over Hansler at least because this claim recites a high-intensity discharge lamp including an arc tube wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide that comprises at least halides of Na, Tl, In, and Tm and a starting gas; and the ratio (MT_m/M) of the mass MT_m of said Tm halide to the total mass M of said metal halide is within a range of about $0.4 \leq MT_m / M \leq 0.9$. Claim 13(6) is patentable over Hansler at least because this claim recites a high-intensity discharge lamp including an arc tube wherein, *inter alia*, the discharge chamber is filled with a discharge medium including a metal halide and a starting gas, the metal halide comprising at least halides of Na, Tl, In, and Tm, wherein the ratio (MT_m/M) of the mass MT_m of said Tm halide to the total mass M of said metal halide is within a range of about $0.4 \leq MT_m / M \leq 0.9$, and wherein the total mass of the halides of Na, Tl, In, and Tm is greater than 90% of the total mass M of the metal halide.

As mentioned previously, Applicants respectfully submit that these features are not rendered obvious in view of Hansler.

Higashi fails to remedy the deficiencies of Hansler. Higashi merely discloses a metal halide lamp but is silent as to the recited metal halides of claims 13(1), 13(2) and 13(6), much less the mass ratio recited by claims 13(1) and 13(6). As such, any reasonable combination of Hansler and Higashi cannot result, in any way, in the invention of claim 13.

Accordingly, reconsideration and withdrawal of the rejection of claim 13 under 35 U.S.C. §103(a) based on Hansler in view of Higashi are respectfully requested.

Applicants have addressed all the Examiner's rejections and respectfully submit that the application is in condition for allowance. A notice to that effect is earnestly solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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